1. **Using our own terms and diagrams, explain INCEPTIONNET ARCHITECTURE.**

A.

InceptionNet, also known as GoogLeNet, is a deep convolutional neural network (CNN) architecture designed by Google researchers. It was developed to improve computational efficiency while maintaining high accuracy in image classification tasks.

Here's a simplified explanation using basic terms and diagrams:

1. \*\*Basic Building Block: Convolutional Layer\*\*

- In InceptionNet, the basic building block is the convolutional layer. This layer applies filters to input images to extract features like edges, textures, and patterns.

![Convolutional Layer](https://i.imgur.com/YaE5FVL.png)

2. \*\*Inception Module:\*\*

- The core innovation of InceptionNet is the Inception module, which incorporates multiple convolutions of different sizes and operations within a single module. This allows the network to capture features at different scales simultaneously.

![Inception Module](https://i.imgur.com/USbe4nw.png)

3. \*\*Parallel Pathways:\*\*

- Within each Inception module, there are parallel pathways of convolutions with different filter sizes. This allows the network to capture both fine-grained and coarse-grained features in parallel.

![Parallel Pathways](https://i.imgur.com/8XvqquZ.png)

4. \*\*Dimensionality Reduction:\*\*

- To reduce the computational cost and the number of parameters, 1x1 convolutions are used for dimensionality reduction before applying larger convolutions. This helps in preserving important features while reducing computational complexity.

![Dimensionality Reduction](https://i.imgur.com/4cqfDta.png)

5. \*\*Global Average Pooling:\*\*

- Instead of using fully connected layers towards the end of the network, InceptionNet uses global average pooling. This computes the average of each feature map, reducing the spatial dimensions to a vector, which is then fed into the final softmax layer for classification.

![Global Average Pooling](https://i.imgur.com/JATjRs2.png)

By incorporating these design principles, InceptionNet achieves high accuracy on image classification tasks while being computationally efficient, making it suitable for real-time applications and deployment on resource-constrained devices.

1. **Describe the Inception block**.

A. The Inception block, a key component of Google's Inception architecture, is designed to capture features at multiple spatial scales by employing filters of different sizes within the same layer. This allows the network to efficiently learn representations at various levels of abstraction.

In an Inception block, the input from the previous layer is simultaneously convolved with filters of different sizes (typically 1x1, 3x3, and 5x5), as well as max-pooled with a 3x3 filter. Additionally, a 1x1 convolutional layer is often included for dimensionality reduction to lower computational cost and aid in feature learning.

By concatenating the outputs of these operations, the network can effectively capture both local and global features, enabling it to learn rich representations of the input data. This architectural design has been widely adopted in various convolutional neural network (CNN) architectures, including Inception v1, v2, v3, and so on, with each iteration refining the block's structure for improved performance and efficiency.

3. What is the DIMENSIONALITY REDUCTION LAYER (1 LAYER CONVOLUTIONAL)?

4. THE IMPACT OF REDUCING DIMENSIONALITY ON NETWORK PERFORMANCE

5. Mention three components. Style GoogLeNet

6. Using our own terms and diagrams, explain RESNET ARCHITECTURE.

7. What do Skip Connections entail?

8. What is the definition of a residual Block?

9. How can transfer learning help with problems?

10. What is transfer learning, and how does it work?

HOW DO NEURAL NETWORKS LEARN FEATURES? 11. HOW DO NEURAL NETWORKS LEARN FEATURES?

12. WHY IS FINE-TUNING BETTER THAN START-UP TRAINING?